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Research

Effect Of Polymers In The Formulation Of Sustained Release Tablets Of Guaifenesin Using Various Hydrophilic Polymers

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Abstract

The aim of the present study was to develop Guaifenesin sustained release tablets to maintain constant therapeutic levels of the drug for over 12 hrs.HPMC K4M, HPMC K15M, Sodium alginate were used as polymers. All the formulations were passed various physicochemical evaluation parameters such as bulk density, tapped density, cars index, hausners ratio, angle of repose, weight variation, hardness, thickness, friability and drug content. From the dissolution studies it was evident that the formulation F7 showed better and desired drug release pattern i.e., 99.88% in 12hrs.

Keywords: Guaifenesin, HPMC K4M, HPMC K15M, Sodium alginate and sustained release tablets.

INTRODUCTION

Oral drug delivery has been known for decades as the most widely utilized route of administered among all the routes that have been employed for the systemic delivery of drug via various pharmaceutical products of different dosage forms. The reasons that the oral route achieved such popularity may be in part attributed to its ease of administration belief that by oral administration of the drug is well absorbed. All the pharmaceutical products formulated for systemic delivery via the oral route of administration irrespective of the mode of delivery (immediate, sustained or controlled release) and the design of dosage forms (either solid dispersion or liquid), must be developed within the intrinsic characteristics of GI physiology, pharmacokinetics, pharmacodymicsand formulation design is essential to achieve a systemic approach to the successful development of an oral pharmaceutical dosage form.[1,2]

SUSTAINED DRUG DELIVERY SYSTEM

Over the past 30 years, as the expense and complication involved in marketing new entities have increased with concomitant recognition of the therapeutics advantages of controlled drug delivery, greater attention has been focused on development of sustained or controlled drug delivery system. Sustained release technology is relatively new field and as a consequence, research in the field has been extremely fertile and has produced many discoveries. With many drugs, the basic goal is to achieve a steady state blood level that is therapeutically effective and non-toxic fir an extended period of time. The design of proper dosage form is an important element to accomplish this goal. Sustained release, sustained action, prolonged action, controlled release, extended action, timed release and depot dosage form are term used to identify drug delivery system that are designed to achieve prolonged therapeutic effect by

continuously releasing medication over an extended period of time after adminisatration of a single dose. In the case of oral sustained released dosage form, an effect is for several hours depending upon residence time of formulation in the GIT.

Physician can achieve several desirable therapeutics advantages by prescribing sustained release dosage form. Since, the frequency of drug administration is reduced, patient's compliances can be improved and the drug administration can be made more convenient as well. The blood level oscillation characteristics of multiple dosing form of conventional dosage form is reduced, because more even blood level is maintained in the design of sustained release dosage form. The total amount of drug administered, thus maximum availability with a minimum dose. In addition, the safety margin of high potency drug can be increased and the incidence of both local and systemic adverse effects can be reduced in sensitive patients. Overall, increased administration of sustained release dosage form gives increased reliability.

Not all the drugs are the suitable candidates for the sustained release dosage form. Ideal characteristic of the drug for the sustained release dosage form are;

- ✓ Drug should have a shorter half-life as drug with a longer half-life are inherently long acting drugs.
- ✓ Drug should be absorbed from large portion of gastrointestinal tract, since absorption must occur through the gut.
- ✓ Drug should be having a good solubility profile to be a good candidate for sustained release dosage form.
- ✓ Dose of the drug should not be too large, as a larger dose is to be incorporated into sustained release dosage form.[3,4,5]

Recent trends in sustained drug delivery system

Sustained release dosage forms are categorized as

- ➢ Single unit dosage form.
- ➢ Multiple unit dosage form.
- ➢ Mucoadhesive system.

Single unit dosage form

These refer to diffusion system where the drug is uniformly distributed (dispersed / dissolved) throughout the solid matrix and the release of the drug is controlled or sustained either by incorporating hydrophilic or hydrophobic filler within the matrix or by coating the drug matrix with a swellable or non-swellable polymer film.

These systems can be classified as

Monolithic system

If the release rate is controlled or sustained by incorporating hydrophilic or hydrophobic filler within the matrix then the system is called as Monolithic device where the diffusion of drug through the matrix is rate- limiting step.

These are categorized as

Hydrophobic/Swellable tablet

Tablet prepared by mixing the drug with hydrophobic/hydrophilic filler appear to extend the release time of the drug from device within the GI tract after oral administration.

Floating tablet or capsule

Designing of Floating tablet or capsule are called hydro-dynamically balanced drug delivery system is based on the principle that device with gravity lesser than that of the gastric juice of stomach and retain the drug in the proximal region of the GIT.

Semisolid matrix system

In this system, the hydrophobic carrier occurs in an oily semisolid state where the drug is incorporated and the final mass is usually filled into gelatin capsule to prepare the dosage form.

Coated tablet and Similar Multilayer system

Multilayer systems are designed in such a way that the drug has to cross a barrier or membrane on its way from the device to the physiological environment. The nature and the number of barriers control the release process. In the simplest form coated tablet comprised a core containing the drug and a coating layer, which surrounds the core. The core is usually the drug either alone or loaded on to an inert material (hydrophilic or hydrophobic).

Multilayered tablet having two or more distinct layers usually prepared by dry coating technique have also been used to formulate sustained or controlled preparations for water-soluble drugs. In this case, coating which controls the release process covers the core tablet containing the drug only partially.

Osmotic device

In osmotic device usually an osmotic agent (often with an osmotic adjuvant) is contained within a rigid compartment that is separated from the osmotic compartment by a partition. In the physiological environment the aqueous fluid penetrates across the membrane and the increased volume within the osmotic compartment pushes the drug out of the device through a delivery orifice.

Multiple unit dosage forms

It represents a combination of subnets of the dosage forms, the source of which may either be homogeneous or heterogeneous. It offers the advantages of releasing one of the drugs or part of the same drug immediately while remaining drug or parts of the same can

be sustained release. These are useful where drug-excipients and drug-drug interactions are inevitable in a single unit dosage form. The various forms are as:

- Micro granules/Spheroids.
- Beads.
- Pellets.
- Microcapsules.

Mucoadhesive systems

It utilizes principle of bioadhesion for optimum delivery of the drug from the device. Bioadhesion is definable as the occurrence in which one biological substance is adhered to another substance, which may either, be of biological or non-biological origin. If the substance is mucosal membrane the phenomenon is known as mucoadhesion. Conventional controlled release dosage forms described above are restrained localized in selected regions of GIT.Mucoaadhsive systems are suitable to increased the contact time of drug with absorbing membrane and localization of delivery of drug at target sites.[3]

MATRIX SYSTEM

The matrix system is most often used for a drug-controlled release from a pharmaceutical dosage form. Among the innumerable method used in controlled release drug from pharmaceutical dosage form, the matrix system is the most frequently applied; it is release system for delay and control of the release of the drug that is dissolved or dispersed in a resistant supports to disintegration. To define matrix, it is necessary to know the characters that differentiate it from other controlled release dossage forms. Hence the following must be considered:

The chemical nature of support (generally, the support are formed by polymeric net)

- ✓ The physical state of drug (dispersed under molecular or particulate form or both)
- ✓ The matrix shape and alteration in volume as a function of time.
- ✓ The route of administration (oral administration remains the most widely used but other route are adaptable)
- ✓ The release kinetic model.

The classification of matrix system

Mineral matrix

- Drug retained in the support.
- Drug adsorbed on the support.

Lipidic matrix

- Delivery by diffusion.
- Delivery by surface erosion.

Hydrophillic matrix

- Unlimited swelling, delivery by diffusion.
- Limited swelling controlled delivery through swelling.

Inert matrix

- Controlled delivery by diffusion.

Biodegradable matrix

- Non-Lipidic.

ADVANTAGES OF MATRIX SYSTEM

1. 1.The interest awakened by matrix system in last few years is completely justified in view of the major advantages. Among these, the following stand out.
2. 2.With proper control of manufacturing process, reproducible release profiles are possible.
3. 3.There is no risk of “dumping” of a large part of dose, through the structure makes the immediate release of a small amount of active principle unavoidable.
4. Their capacity to incorporate active principle is large, which suits them to delivery of large dosage.[6]

The Following are the Rationale of Developing SR Matrix DDS To extend the duration of action of the drug

- ✓ To reduce the frequency of dosing
- ✓ To minimize the fluctuations in plasma
- ✓ level Improved drug utilization
- ✓ Less adverse effects

Advantages of SR Matrix DDS

- ✓ The frequency of drug administration is reduced.
- ✓ Patient compliance can be improved.
- ✓ Drug administration can be made more convenient as well.
- ✓ The blood level oscillation characteristic of multiple dosing of conventional dosage forms is reduced.

- ✓ Better control of drug absorption can be attained, since the high blood level peaks that may be observed after administration of a dose of a high availability drug can be reduced.
- ✓ The characteristic blood level variations due to multiple dosing of conventional dosage forms can be reduced.
- ✓ The total amount of drug administered can be reduced, thus:
  -Maximizing availability with minimum dose
  -Minimize or eliminate local side effects
  -Minimize or eliminate systemic side effects
  -Minimize drug accumulation with chronic dosing
- ✓ Safety margins of high potency drugs can be increased and the incidence of both local and systemic adverse side effects can be reduced in sensitive patients.
- ✓ Improve efficiency in treatment.
  - Cure or control condition more promptly
  -Improve control of condition
  -Improve bioavailability of some drugs
  -Make use of special effects; e.g. sustain release aspirin for morning relief of arthritis by dosing before bed-time.
- ✓ Economy.

Disadvantages of SR matrix DDS

- ✓ Probability of dose dumping.
- ✓ Reduced potential for dose adjustment.
- ✓ Cost of single unit higher than conventional dosage forms.
- ✓ Increase potential for first pass metabolism.
- ✓ Requirement for additional patient education for proper medication.
- ✓ Decreased systemic availability in comparison to immediate release conventional dosage forms.
- ✓ Poor in vitro and in vivo correlations.

MATERIALS

Guaifenesin-Procured From Hetero drugs private limited, Hyderabad. Provided by SURA LABS, Dilsukhnagar, Hyderabad, HPMC K4M-S. D. Fine Chem. Labs. Mumbai, India, HPMC K15M-S. D. Fine Chem. Labs. Mumbai, Sodium alginate-S. D. Fine Chem. Labs. Mumbai, Magnesium stearate-S. D. Fine Chem. Labs. Mumbai, Talc-S. D. Fine Chem. Labs. Mumbai, Micro crystalline cellulose-S. D. Fine Chem. Labs. Mumbai

METHODOLOGY

Analytical method development

7.1.1 Determination of Wavelength

10mg of pure drug was dissolved in 10ml methanol (primary stock solution - 1000 µg/ml). From this primary stock solution 1 ml was pipette out into 10 ml volumetric flask and made it up to 10ml with the media (Secondary stock solution – 100µg/ml). From secondary stock solution again 1ml was taken it into another volumetric flask and made it up to 10 ml with media (working solution - 10µg/ml). The working solution was taken for determining the wavelength.

7.1.2 Determination of Calibration Curve

10mg of pure drug was dissolved in 10ml methanol (primary stock solution - 1000 µg/ml). From this primary stock solution 1 ml was pipette out into 10 ml volumetric flask and made it up to 10ml with the media (Secondary stock solution – 100µg/ml). From secondary stock solution required concentrations were prepared (shown in Table 8.1 and 8.2) and those concentrations absorbance were found out at required wavelength.

7.2. Drug – Excipient compatibility studies

Fourier Transform Infrared (FTIR) spectroscopy

The compatibility between the pure drug and excipients was detected by FTIR spectra obtained on Bruker FTIR Germany (Alpha T). The solid powder sample directly place on yellow crystal which was made up of ZnSe. The spectra were recorded over the wave number of 4000cm^{-1} to 400cm^{-1}.

7.3. Preformulation parameters

The quality of tablet, once formulated by rule, is generally dictated by thequality of physicochemical properties of blends. There are many formulations and process variables involved in mixing and all these can affect the characteristics of blends produced. The various characteristics of blends tested as per Pharmacopoeia.

Angle of repose

The frictional force in a loose powder can be measured by the angle of repose. It is defined as, the maximum angle possible between the surface of the pile of the powder and the horizontal plane. If more powder is added to the pile, it slides down the sides of the pile until the mutual friction of the particles producing a surface angle, is in equilibrium with the gravitational force. The fixed funnel method was employed to measure the angle of repose. A funnel was secured with its tip at a given height (h), above a graph paper that is placed on a flat horizontal surface. The blend was carefully pored through the funnel until the apex of the conical pile just touches the tip of the funnel. The radius (r) of the base of the conical pile was measured. The angle of repose was calculated using the following formula:

$\tan \theta = h / r$ $\tan \theta$ = Angle of repose

h = Height of the cone , r = Radius of the cone base

Table 1: Angle of Repose values (as per USP)

Angle of Repose	Nature of Flow
<25	Excellent
25-30	Good
30-40	Passable
>40	Very poor

Bulk density

Density is defined as weight per unit volume. Bulk density, is defined as themass of the powder divided by the bulk volume and is expressed as gm/cm^3. The bulk density of a powder primarily depends on particle size distribution, particle shape and the tendency of particles to adhere together. Bulk density is very important in the size of containers needed for handling, shipping, and storage of raw material and blend. It is also important in size blending equipment. 10 gm powder blend was sieved and introduced into a dry 20 ml cylinder, without compacting. The powder was carefully leveled without compacting and the unsettled apparent volume, Vo, was read.

The bulk density was calculated using the formula:

$$\text{Bulk Density} = M / V_o$$

Where,M = weight of sample

V_o = apparent volume of powder

Tapped density

After carrying out the procedure as given in the measurement of bulk densitythe cylinder containing the sample was tapped using a suitable mechanical tapped density tester that provides 100 drops per minute and this was repeated until difference between succeeding measurement is less than 2 % and then tapped volume, V measured, to the nearest graduated unit. The tapped density was calculated, in gm per L, using the formula:

$$\text{Tap} = M / V$$

Where,Tap= Tapped Density

M = Weight of sample

V= Tapped volume of powder

Measures of powder compressibility

The Compressibility Index (Carr's Index) is a measure of the propensity of a powder to be compressed. It is determined from the bulk and tapped densities. In theory, the less compressible a material the more flowable it is. As such, it is measures of the relative importance of interparticulate interactions. In a free- flowing powder, such interactions are generally less significant, and the bulk and tapped densities will be closer in value.

For poorer flowing materials, there are frequently greater interparticle interactions, and a greater difference between the bulk and tapped densities will be observed. These differences are reflected in the Compressibility Index which is calculated using the following formulas:

$$\text{Carr's Index} = [(\text{tap} - b) / \text{tap}] \times 100$$

Where, b = Bulk Density

Tap = Tapped Density

Table 2: Carr's index value (as per USP)

Carr's index	Properties

5 – 15	Excellent
12 – 16	Good
18 – 21	Fair to Passable
2 – 35	Poor
33 – 38	Very Poor
>40	Very Very Poor

7.4. Formulation development of Tablets

All the formulations were prepared by direct compression. The compositions of different formulations are given in Table 7.3.The tablets were prepared as per the procedure given below and aim is to prolong the release of Guaifenesin. Total weight of the tablet was considered as 100mg.

Procedure

1) Guaifenesin and all other ingredients were individually passed through sieve no ≠ 60.
2) All the ingredients were mixed thoroughly by triturating up to 15 min.
3) The powder mixture was lubricated with talc.
4) The tablets were prepared by using direct compression method.

Table 3: Formulation composition for tablets

Formulation No.	F1	F2	F3	F4	F5	F6	F7	F8	F9
Guaifenesin	200	200	200	200	200	200	200	200	200
HPMC K4M	20	40	60	-	-	-	-	-	-
HPMC K15M	-	-	-	20	40	60	-	-	-
Sodium alginate	-	-	-	-	-	-	20	40	60
Magnesium stearate	5	5	5	5	5	5	5	5	5
Talc	5	5	5	5	5	5	5	5	5
Micro crystalline cellulose	120	100	80	120	100	80	120	100	80
Total Weight	350	350	350	350	350	350	350	350	350

All the quantities were in mg

RESULTS AND DISCUSSIONS

The present study was aimed to developing Controlled release tablets of Guaifenesin using various polymers. All the formulations were evaluated for physicochemical properties and *in vitro* drug release studies.

8.1. Analytical Method

Graphs of Guaifenesin were taken in 0.1N HCL and in pH 6.8 phosphate buffer at 274 nm and 279nm respectively.

Table 4: Observations for graph of Guaifenesin in 0.1N HCL (274 nm)

Conc [µg/ml]	Absorbance
0	0
2	0.168
4	0.345
6	0.527
8	0.714
10	0.899

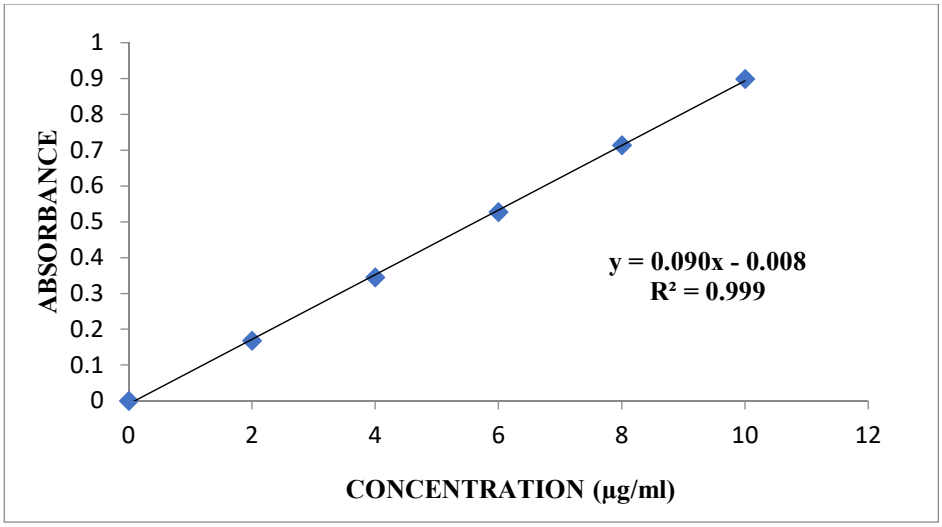

Fig 1: Standard graph of Guaifenesin in 0.1N HCL

Table 5: Observations for graph of Guaifenesin in pH 6.8 phosphate buffer (279nm)

Concentration [µg/ml]	Absorbance
0	0
2	0.146
4	0.327
6	0.476
8	0.659
10	0.833

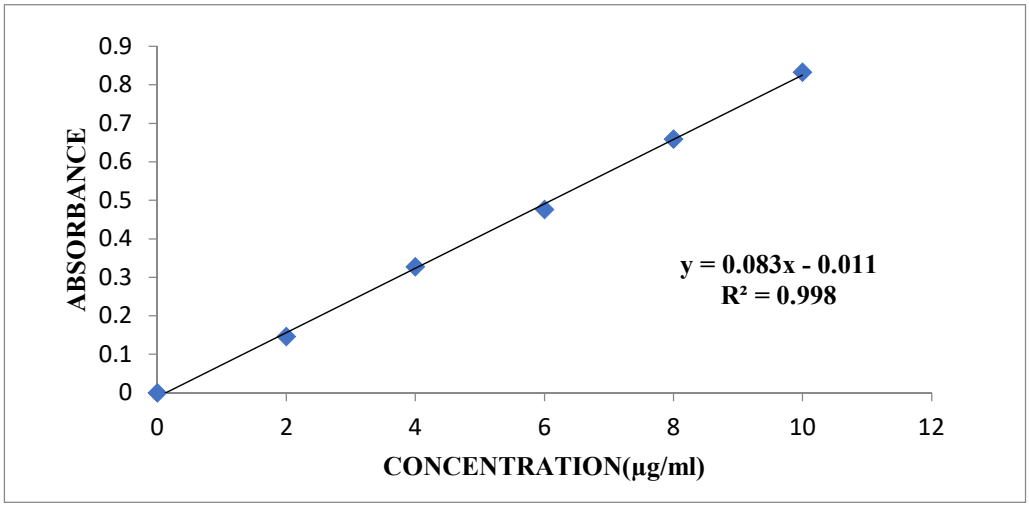

Fig 2: Standard graph of Guaifenesin pH 6.8 phosphate buffer (279nm)

8.2.Preformulation parameters of powder blend

Table 6: Pre-formulation parameters of Core blend

Formulation Code	Angle of repose(θ)	Bulk density (gm/cc)	Tapped density (gm/cc)	Carr's index	Hausner ratio
F1	25.23	0.515	0.598	13.88	1.161
F2	23.25	0.525	0.61	13.934	1.162
F3	24.62	0.535	0.609	12.151	1.138
F4	24.56	0.512	0.587	12.777	1.146

F5	25.72	0.499	0.574	13.066	1.15
F6	24.3	0.512	0.582	12.027	1.137
F7	27.8	0.502	0.572	12.238	1.139
F8	25.54	0.518	0.586	11.604	1.131
F9	26.32	0.486	0.564	13.83	1.16

The micrometric properties of blend of Formulation blend were characterized with respect to angle of repose, bulk density, tapped density, Carr's index and Hausner's ratio. Angle of repose was less than 29.540, Carr's index values were 11.604 to 13.934 for the pre compression blend of all the batches indicating good to fair flow ability and compressibility. Hausner's ratio was less than 13.88 for all the batches indicating good flow properties.

8.3. Quality Control Parameters For tablets

Tablet quality control tests such as weight variation, hardness, and friability, thickness, and drug release studies in different media were performed on the compression coated tablet.

Table 7: *In vitro* quality control parameters for tablets

Formulation codes	Average Weight (mg)	Hardness (kg/cm2)	Friability (%loss)	Thickness (mm)	Drug content (%)
F1	345.017	4.49±0.1	0.56	3.33±0.23	99.26
F2	349.026	4.55±0.11	0.47	3.45±0.45	97.45
F3	344.011	4.78±0.9	0.34	3.29±0.22	98.37
F4	348.024	4.69±0.7	0.43	3.39±0.31	99.69
F5	346.027	4.58±0.16	0.51	3.41±0.07	97.49
F6	349.009	4.63±0.7	0.45	3.32±0.12	98.28
F7	350.015	4.82±0.5	0.42	3.28±0.30	100.09
F8	351.018	4.73±0.18	0.55	3.42±0.13	99.44
F9	348.011	4.66±0.13	0.57	3.51±0.16	98.66

Weight variation test: Tablets of each batch were subjected to weight variation test, difference in weight and percent deviation was calculated for each tablet and was shown in the Table 8.4. The average weight of the tablet is approximately in range of 344.011 to 351.018mg, so the permissible limit is ±7.5% (>350 mg). The results of the test showed that, the tablet weights were within the pharmacopoeia limit.

Hardness test: Hardness of the three tablets of each batch was checked by using Pfizer hardness tester and the data's were shown in Table 8.4. The results showed that the hardness of the tablets is in range of 4.49±0.1 to4.82±0.5 kg/cm^2,which was within IP limits.

Thickness: Thickness of three tablets of each batch was checked by using Micrometer and data shown in Table-8.4. The result showed that thickness of the tablet is raging from 3.28±0.30 to 3.51±0.16 mm.

Friability: Tablets of each batch were evaluated for percentage friability and the data were shown in the Table 8.4. The average friability of all the formulations was less than 1% as per official requirement of IP indicating a good mechanical resistance of tablets.

Drug content: Drug content studies were performed for the prepared formulations. From the drug content studies it was concluded that all the formulations were showing the % drug content values within 97.45 - 100.09 %.

All the parameters such as weight variation, friability, hardness, thickness and drug content were found to be within limits.

***8.4. In vitro* Drug Release Studies**

Table 8: Dissolution data of Guaifenesin tablets

TIME	CUMULATIVE PERCENT DRUG DISSOLVED								
(hr)	F1	F2	F3	F4	F5	F6	F7	F8	F9
0	0	0	0	0	0	0	0	0	0
1	18.05	23.41	25.61	18.88	22.19	14.76	24.55	20.37	15.35
2	34.22	36.37	44.54	36.31	40.98	29.36	32.38	38.77	42.44
3	55.47	62.56	59.85	50.55	55.78	46.22	39.18	55.49	56.28
4	68.52	73.07	67.73	62.34	65.37	53.89	45.77	67.72	60.07
5	72.66	85.92	76.69	70.32	78.26	61.17	56.64	73.66	65.12
6	79.19	91.11	88.48	78.43	80.88	68.98	62.58	82.12	69.03
7	83.79	95.47	92.76	85.45	82.19	72.42	79.33	87.27	73.31
8	91.69	98.12	95.44	90.63	88.24	78.55	84.76	91.56	77.22
9	93.99		96.38	93.53	91.65	83.64	91.29	95.39	80.76
10	95.12		97.74	95.64	96.28	88.76	96.44	96.17	82.09

11	97.33	98.77	96.35	92.69	98.91	96.49	89.15
12		98.77	98.74	96.28	99.88	96.49	92.64

From the dissolution data it was evident that the formulations prepared with HPMC K4Mas polymer were unable to retard the drug release up to desired time period i.e., 12 hours. Formulations prepared with Sodium Alginate retarded the drug release in the concentration of 20mg (F7Formulation) showed required release pattern i.e., retarded the drug release up to 12 hours and showed maximum of 99.88% in 12 hours with good retardation. The formulations prepared with HPMC K15Mwere unable to retard up to 12 hours in a sustained manner. Hence they were not considered.

8.5 Application of Release Rate Kinetics to Dissolution Data

Various models were tested for explaining the kinetics of drug release. To analyze the mechanism of the drug release rate kinetics of the dosage form, the obtained data were fitted into zero-order, first order, Higuchi, and Korsmeyer-Peppas release model.

Table 9: Release kinetics data for optimised formulation

Cumulative (%) Release Q	Time (T)	Root (T)	Log(%) Release	Log (T)	Log (%) Remain	Release Rate (Cumulative % Release / T)	1/Cum% Release	Peppas Log Q/100	% Drug Remaining	Q01/3	Qt1/3	Q01/3-Qt1/3
0	0	0			2.000				100	4.642	4.642	0.000
24.55	1	1.000	1.390	0.000	1.878	24.550	0.0407	-0.610	75.45	4.642	4.226	0.416
32.38	2	1.414	1.510	0.301	1.830	16.190	0.0309	-0.490	67.62	4.642	4.074	0.568
39.18	3	1.732	1.593	0.477	1.784	13.060	0.0255	-0.407	60.82	4.642	3.933	0.709
45.77	4	2.000	1.661	0.602	1.734	11.443	0.0218	-0.339	54.23	4.642	3.785	0.856
56.64	5	2.236	1.753	0.699	1.637	11.328	0.0177	-0.247	43.36	4.642	3.513	1.128
62.58	6	2.449	1.796	0.778	1.573	10.430	0.0160	-0.204	37.42	4.642	3.345	1.297
79.33	7	2.646	1.899	0.845	1.315	11.333	0.0126	-0.101	20.67	4.642	2.744	1.897
84.76	8	2.828	1.928	0.903	1.183	10.595	0.0118	-0.072	15.24	4.642	2.479	2.162
91.29	9	3.000	1.960	0.954	0.940	10.143	0.0110	-0.040	8.71	4.642	2.057	2.584
96.44	10	3.162	1.984	1.000	0.551	9.644	0.0104	-0.016	3.56	4.642	1.527	3.115
98.91	11	3.317	1.995	1.041	0.037	8.992	0.0101	-0.005	1.09	4.642	1.029	3.612
99.88	12	3.464	1.999	1.079	-0.921	8.323	0.0100	-0.001	0.12	4.642	0.493	4.148

8.6. Drug – Excipient compatability studies

Fourier Transform-Infrared Spectroscopy

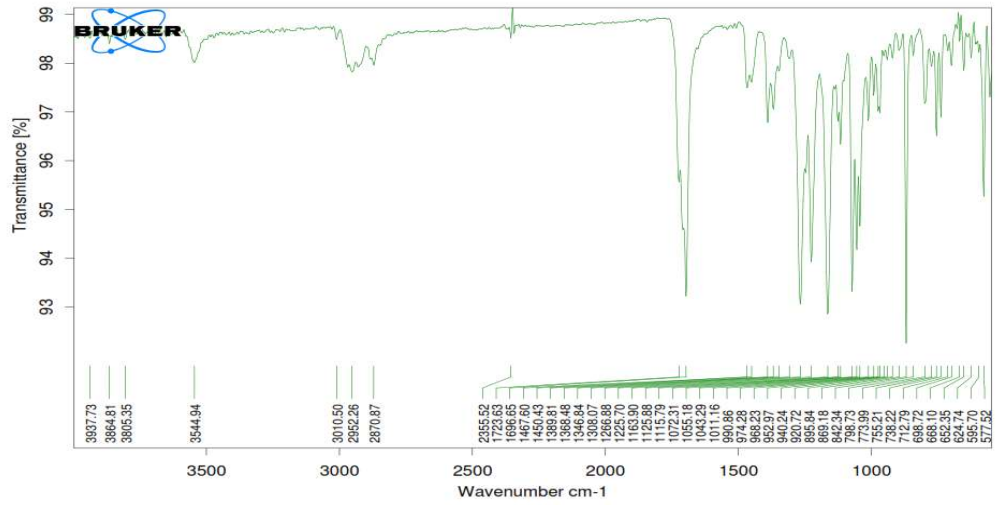

Fig 3: FT-IR Spectrum of Guaifenesin pure drug

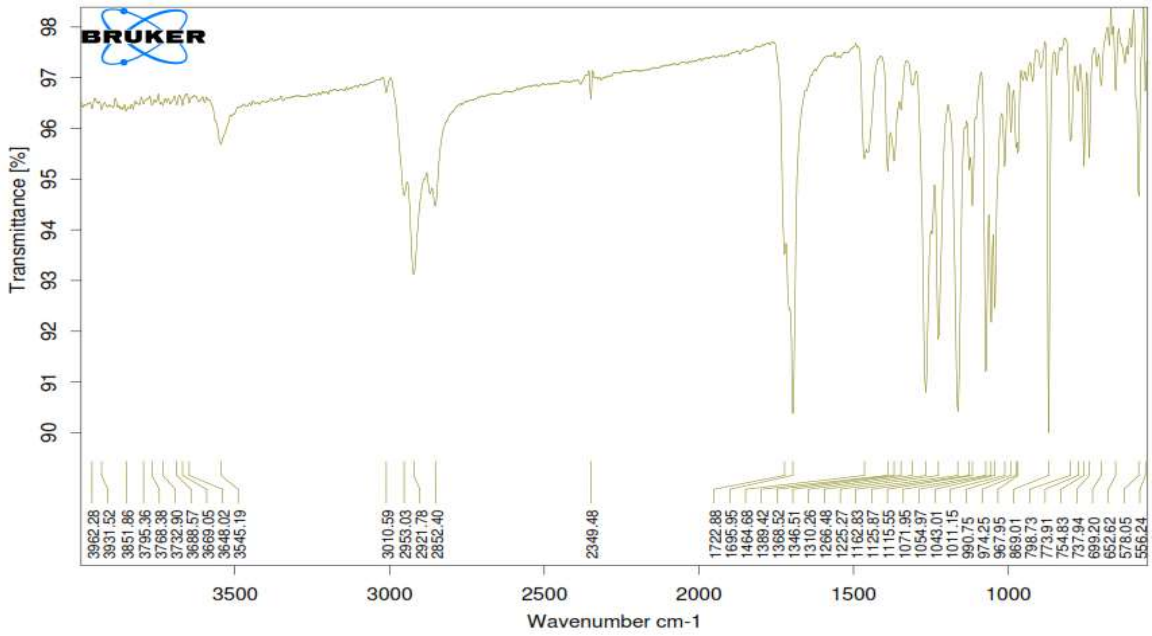

Fig 4: FT-IR Spectrum of Optimised Formulation

From the above studies it was found that there was no shifting in the majorpeaks which indicated that there were no significant interactions occurred between theGuaifenesin and excipients used in the preparation of different Guaifenesin Sustained release formulations. Therefore the drug and excipients are compatible to form stable. Formulations under study, The FTIR spectra of Guaifenesin and physical mixtureused for optimized formulation were obtained and these are depicted in above figures. From the FTIR data it was evident that the drug and excipients doses not have any interactions. Hence they were compatible.

CONCLUSION

The present work deals with the aim to formulate and evaluate the sustained release tablet of Guaifenesin. From result obtained it was concluded that the formulation of sustained release tablet of Guaifenesin containing hydrophilic polymers HPMC and sodium alginate were capable of exhibiting sustained release properties. They are capable of reducing the does in take minimize the blood level oscillation does related adverse effect and cost thus improves the patient compliance in the therapeutic management is used to reduce chest congestion caused by the common cold, infections, or allergies.

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